SAN LUIS OBISPO COUNTY

DEPARTMENT OF PLANNING AND BUILDING

DATE: April 10, 2014

TO: Planning Commission

FROM: Ryan Hostetter, Senior Planner

SUBJECT: Loperena Coastal Development Permit DRC2005-00216

A letter dated April 1, 2014 was submitted to the Commission by Mr. Kevin Elder from Sinsheimer, Juhnke, McIvor and Stroh LLP. Following is a staff response to the comments submitted in the letter:

1. California Coastal Commission Letter

Planning Staff specifically responded to the Coastal Commission letter and direct responses are outlined in the Final EIR pages 9-14 through 9-16.

a. Visual Resources

Regarding Visual Resource Policies, County staff has addressed these concerns, including specific Visual and Scenic Resources policies in the Final EIR (refer to Table 3-1 Consistency with Plans and Policies). In addition, the applicant has provided a revised project design that significantly reduces the length and mass of the structure and responds to comments from the Planning Commission hearing regarding the overall design and exterior appearance.

b. Bluff Setbacks

Staff has received and considered all correspondence from the Coastal Commission. We have not received a formal response or indication of an in depth evaluation of all the geologic information from the Coastal Commission's geologist. The comments regarding determination of the coastal bluff and bluff setback are addressed in both the Final EIR and the Planning Commission Staff Report. Based on review of substantial evidence documented in the Final EIR and appendices (Cotton Shires and Associates 2011, 2012), it is County staff's recommendation that the site is not interpreted to be a coastal bluff, and the subsequent coastal bluff setbacks are not applicable. Even so, the intent of County LCP Hazards Policy 6 is applicable, and states that:

"New development or expansion of existing uses on blufftops shall be designed and set back adequately to assure stability and structural integrity and to withstand bluff erosion and wave action for a period of 75 years without construction of shoreline protection structures which would require substantial alterations to the natural landforms along bluffs and cliffs. A site stability evaluation report shall be prepared and submitted by a certified engineering geologist

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based upon an on-site evaluation that indicates that the bluff setback is adequate to allow for bluff erosion over the 75 year period. Specific standards for the content of geologic reports are contained in the Coastal Zone Land Use Ordinance."

Based on the analysis documented in the Final EIR, coastal hazards analysis provided in the EIR and public record (GeoSoils, Inc. 2013, 2014), the presence of erosion-resistant bedrock, and compliance with mitigation measure GS/mm-4, which requires the use of deepened pier foundations identified in the Engineering Evaluation (Shoreline Engineering 2012) and Updated Geotechnical Investigation (GSI Soils, Inc. 2011), the project would maintain stability and structural integrity, and would withstand erosion and wave action consistent with this policy. There is no evidence that shoreline protection structures would be required for the structure, provided it is constructed pursuant to mitigation identified in the Final EIR and following the recommendations identified in referenced geotechnical reports.

c. Sea Level Rise and Coastal Hazards

The noted policies are specifically addressed in the Final EIR (Table 3-1. Consistency with Plans and Policies). As noted above, the structure itself would be designed consistent with geotechnical recommendations, which would "minimize risks to human life and property", and "ensure structural stability while not creating or contributing to erosion or geologic instability" (Hazards Policies 1 and 2). Aerial photos show that the bedrock outcrop west of the structure would withstand direct wave action and exposure, and would not require protection over the next 100 years. Beach scour would occur naturally at the toe of the bedrock, and would not adversely affect the structure. While the residence and associated components (i.e., foundation, structure walls, and retaining walls perpendicular to the beach) would be constructed to maintain integrity in a coastal environment, these features are not considered shoreline protection by County staff because no features would extend beyond the structure and driveway in order to prevent erosion of land and any other hazard typically addressed by sea walls (e.g., bluff instability resulting in the residence falling into the beach area). The Final EIR and technical reports currently in the public record (GeoSoils, Inc. 2013, 2014) address and assess exposure to coastal hazards, and support staff's recommendation that the noted exposure (including future hazards over the next 100 years) would not have a significant adverse effect on structural integrity.

2. Coastal Bluff

County staff's recommended bluff interpretation is supported by substantial evidence documented in the Final EIR, staff report, hearing presentation, and response to questions and comments during the hearing. The project site's exposure to marine erosion is documented and disclosed in all documents, and it is County staff's recommendation that this fact by itself does not support a conclusion that the project would be located on a coastal bluff. As noted above, County staff has considered and addressed potential hazards that may affect the project site due to its location. The revised project lower floor footprint is located approximately 10 to 25 feet (although it varies due to the angle of the edge) from the western edge of the "bluff" and approximately 3 to 5 feet from the edge of the iceplant on the northern side. The analysis

conducted by County geologists determined this is appropriate for 100 years of coastal processes.

The inapplicability of a 500-foot bluff termini analysis is addressed in the Final EIR, and all presentation materials are part of the public record. The bluff edge delineation is presented in the EIR Appendix (refer to Cotton Shires and Associates 2011, Figure 6).

3. Setback from Creek

The geologic description of the project site and surrounding area is described in the EIR and technical appendix (Cotton Shires and Associates 2011). As noted in these documents, the site is located on a bedrock remnant of a fluvial bluff that is now mostly buried under artificial fill material that was put in place during construction of Studio Drive and Highway 1. This portion of the bedrock outcrop was formed by fluvial erosion from the ancestral flow of Old Creek at a time when the creek was located south of its current location. The coastal bluff terminates southeast of the project site. The current alignment and floodplain of Old Creek (and associated Environmentally Sensitive Habitat Area [ESHA] designation) are located approximately 600 feet to the northeast, and features between the site and the creek include Studio Drive (and associated fill prism) and a parking area. The project site is located well outside of the buffer zone for the creek, and would not have an adverse effect on sensitive habitat, surface waters, or vegetation present within Old Creek.

4. Sea Level Rise

a. County Energy Wise Plan

The predicted estimate for sea level rise is based on best available recent information provided in California Coastal Commission Guideline document (which only identifies sea level rise up to the year 2100) and the County's most recent Local Hazard Mitigation Plan (draft December 2013 to County Board of Supervisors). The County Energy Wise Plan (November 2011) states an estimated sea level rise from 3.3 to 4.6 feet by 2100 which is not as conservative as the most recent data used in the project analysis of 5.5 feet.

b. Coastal Hazards Analysis

Please refer to the attached memorandum (GeoSoils, Inc. 2014) for responses to specific technical questions regarding the modeling and conclusions.

c. New Information

Copies of the updated analysis were provided to the public as a part of the record in the staff report presented to the Planning Commission. Pursuant to CEQA *Guidelines* Section 15088.5 (Recirculation of an EIR Prior to Certification): "*A lead agency is required to recirculate an EIR when significant new information is added to the EIR .the term "information" can include changes in the project or environmental setting as well as additional data or other information New information added to an EIR is not "significant" unless the EIR is change in a way that deprives the public of a meaningful opportunity to comment upon a substantial adverse*

environmental effect of the project or a feasible way to mitigate or avoid such an effect (including a feasible project alternative) that the project's proponents have declined to implement. "Significant new information" requiring recirculation include, for example, a disclosure showing that:

(1) A new significant environmental impact would result from the project or from a new mitigation measure proposed to be implemented.

(2) A substantial increase in the severity of an environmental impact would result unless mitigation measures are adopted that reduce the impact to a level of insignificance.

(3) A feasible project alternative or mitigation measure considerably different from others previously analyzed would clearly lessen the environmental impacts of the project, but the projects' proponents decline to adopt it.

(4) The draft EIR was so fundamentally and basically inadequate and conclusory in nature that meaningful public review and comment were precluded."

County staff carefully reviewed new information provided in the Final EIR and during the hearing process to determine if the information is significant, and if the new information triggers recirculation based on the parameters noted above. The additional analysis and documentation provide further substantial evidence supporting the conclusions documented in the EIR and recommended CEQA Findings and do not result in a new significant impact or increase the severity of identified impacts. The applicant has agreed to the recommended mitigation measures and has complied with the Planning Commission's request for a reduced project alternative, similar to alternatives provided in the Final EIR. Therefore, it is County staff' recommendation that the new information does not require recirculation of the EIR because the new information merely clarifies and amplifies the substantial evidence already presented in an adequate Final EIR.

5. New Alternative Layout

Please refer to responses above regarding County staff's recommendation regarding the bluff interpretation, which is pertinent to comments regarding determination of setbacks. Consideration of potential coastal hazards under current conditions and over the next 100 years is addressed in the Final EIR and subsequent documentation including review of the applicant's revised project. Based on this review, substantial evidence in the record, and incorporation and compliance with recommended mitigation measures, the structure would withstand noted coastal hazards, including sea level rise, wave run-up, bluff erosion, and wave action.

Regarding applicability of the gross structural area (GSA) planning area standards, the maximum GSA including garages is 3,500 square feet. The "bluff top" standard contained within the "Community Small Scale Design Neighborhoods" section of the Estero Area Plan is intended to apply to development on the ocean-side of the local road (i.e. Studio Drive and Pacific Avenue). As noted in the EIR and staff report, the project site is located in a unique

location to the north of the coastal bluff terminus. The row of residences immediately to the southeast, along Studio Drive, are located on a coastal bluff. Application of the GSA standard (3,500 square feet) would be consistent with the existing neighborhood character and the intent of the standard. The revised project, however also complies with the GSA requirements for residences which are considered "non bluff top lots" which outlines a maximum GSA of 55% of the usable lot. This has in the past been considered the size of the lot that can be used for the project and any outdoor areas (yard, parking etc.). Because the sandy beach is usable by the applicant for yard area and recreational purposes (as would any typical back yard) it was considered within the calculation. The project complies with this requirement at a max GSA of 1,894 square feet (includes garage, basement, main living area of the residence and is not required to include mezzanine).

6. Good Neighbor Issue

Regarding the Stringline Method, the proposed development would not extend beyond the average trend of adjacent structures to the south. The row of houses follows a line generally parallel to the shoreline, with the houses facing the southwest, up to the last existing house (adjacent to the project site), which is set closer to Studio Drive. The landform then clearly transitions to the northeast, which is a variation in the shoreline. The applicant has submitted a revised and reduced project design, which eliminates previous structural components extending to the southwest.

7. Cypress Tree

As noted in the EIR, implementation of the project would require the removal of the pine tree, and would result in impacts to the noted cypress tree, including impacts to the root zone (refer to BR Impact 4). The gas line that would require removal is located under the proposed residence, and removal would not affect the cypress tree. The majority of root zone impacts would occur as a result of the constructed retaining wall and drainage improvements. Mitigation is identified to avoid unnecessary disturbance of the tree, and impacts to the root zone, including placement of protection fencing to avoid inadvertent disturbance. County staff has considered the noted concerns, and recommends the following additional condition to provide further protection of the tree during construction:

"Prior to issuance of grading permits, the applicant shall retain a certified arborist to conduct any site preparation activities requiring cuts or impacts to the root zone of the existing mature cypress tree. The certified arborist shall monitor work within the root zone, including grading and excavation for the retaining wall, and utility work. The applicant shall comply with methods identified by the certified arborist to avoid unnecessary damage to the root zone, including use of hand tools, protection and treatment of exposed roots during construction, and use of tunneling under shallow roots for utility installation in lieu of standard trenching."

Responses to Haro, Kasunich and Associates, Inc. Letter (March 31, 2014)

A. Comments Regarding March 12, 2014 Sea Level Rise and Coastal Hazard Letter

Please refer to attached Memorandum (GeoSoils, Inc. 2014).

Worst Case Profile Not Utilized In Analysis:

The profile chosen for the analysis is the cross-section most vulnerable to wave run-up attack. The northern property line is at an angle (not parallel) to incoming waves, and therefore would not be subject to worst-case wave run-up conditions. In addition, mitigation (GS/mm-4 listed above) would require deepened pier foundations consistent with the geotechnical report (GSI Soils, Inc. 2011) and subsequent peer review (Cotton Shires and Associates 2011) prepared for the project. This measure is applicable to both the previously proposed project and the applicant's redesigned project, and remains necessary to avoid significant erosion hazards over the next 100 years.

Attachments:

Letter from GSI Soils Inc., David W. Skelly MS, April 4, 2014

GeoSoils, Inc.

Geotechnical • Geologic • Coastal • Environmental

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April 4, 2014

WO 6206-SC

Ms. Shawna Scott
SWCA Environmental Consultants
1422 Monterey Street, Suite C200
San Luis Obispo, CA 93401

SUBJECT: Response to Haro, Kasunich, and Associates, Inc., Comments on GeoSoils Inc. March 12, 2014 Report dated 31 March 2014.

REFERENCE: "Sea Level Rise and Coastal Hazard Discussion, Northwest and Immediately Adjacent to 2612 Studio Drive (APN 064-253-07), Cayucos, San Luis Obispo County, California" dated March 12, 2014 by GeoSoils Inc..

Dear Ms. Scott:

At your request, GeoSoils Inc. (GSI) has prepared the following response to comments by Haro, Kasunich, and Associates, Inc.(HKA) in their 31 March 2014 letter. For ease of review the HKA comment will be provided in italics followed by our response.

Maximum Breaking Wave Heights Underestimated in Analysis:

"We note that the prior April 10, 2013 GeoSoils report indicates that with 2.5 feet of future sea level rise the water surface used for wave runup and overtopping analysis will be at an elevation +10.1 feet NAVD88; and the maximum scour elevation at the toe of the rock outcropping (coastal bluff) is at 3.1 feet NAVD88. This yields a water depth of 7.0 feet at the toe of the rock outcropping (coastal bluff), which was used in the 2013 GeoSoils analysis, which used a 5.5 foot high wave at the toe. The "new" March 12, 2014 GeoSoils analysis uses future sea level rise amounts of 4.6 and 5.5 feet respectively, which makes the water surface used for wave runup and overtopping analysis be at an elevation +12.1 and 13.0 feet NAVD88. GeoSoils acknowledges this by using water depths of 9.0 and 9.9 feet at the toe of the rock outcropping (coastal bluff) for the 2014 analysis. They then use 7.0 and 7.7 foot high waves at the toe in the analysis. Larger waves than those they used in their analysis have the potential to occur at the site. Our analysis suggests that wave heights of 8.9 to 9.8 feet could occur at the toe of the bluff and are appropriate. Use of appropriate wave heights would significantly increase wave runup, overtopping frequency and: overtopping volumes at the site. With future sea level rise, deeper water will occur at the toe of the bluff, and larger waves will break there creating higher wave runup; this will result in greater rates of bluff overtopping more frequent wave impact on the proposed home, and more rapid. bluff erosion, which will erode the bluff over time."

Response:

We respectfully disagree. The waves that break right at the toe of the rock outcropping will provide the maximum wave runup. The breaker height is depth limited by the depth of the water to the toe of the rock outcropping. The design water elevation was determined using the California Coastal Commission (CCC) Draft Sea-Level Rise (SLR) Policy Guidance document. The CCC method uses the highest recorded water level in the area corrected for future SLR. The bedrock material at the toe of the rock outcropping is very erosion resistant and is not subject to significant down wearing over time. The design water depths dictate the breaker heights. Figure 1 below, taken from the FEMA Coastal Construction Manual (Figure 8-11), shows the relationship between water depth and breaker height (the blue line on the graph). For 9 feet and 9.9 feet of still water depth the breaker height is 7 feet and 7.7 feet respectively.

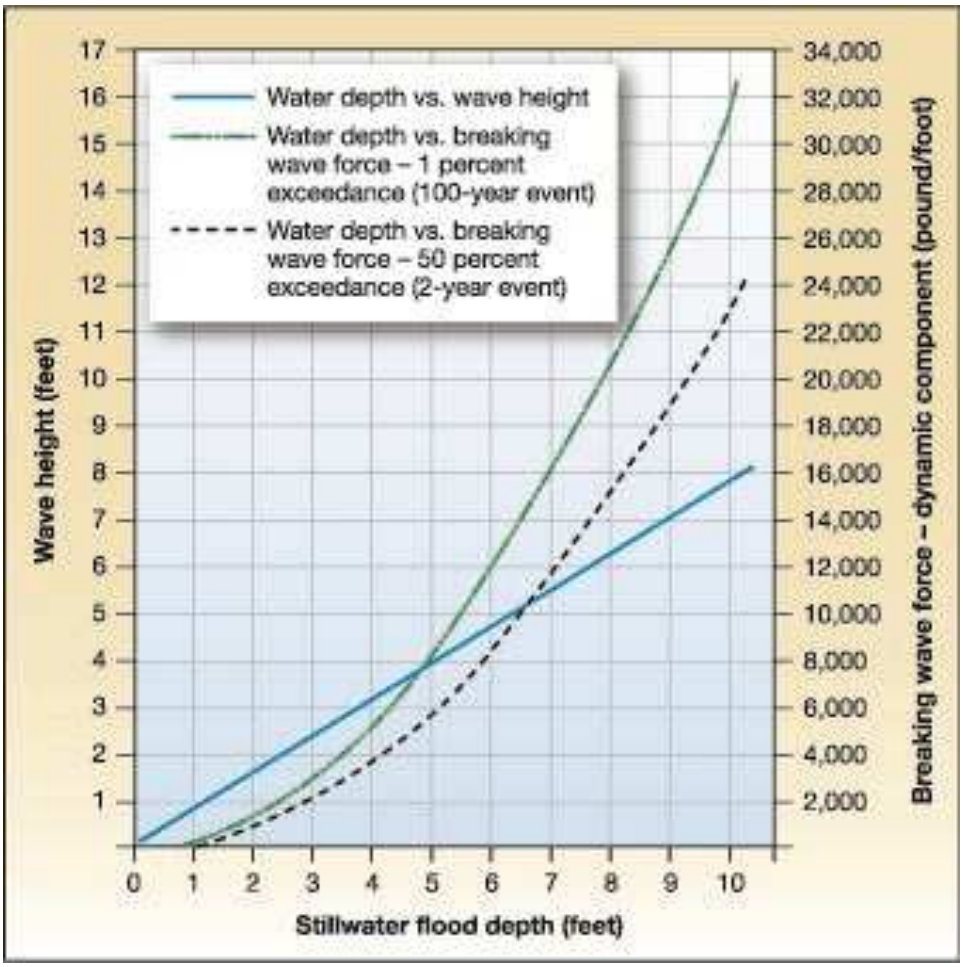

Figure 1. Relationship between water depth and breaker height from FEMA.

Waves in excess of these heights can occur offshore of the site and away from the toe of the rock outcropping, but they will always break in a water depth that is about 1.28 times the wave height. Once a wave has broken, the wave bore height is typically less than ½ of the breaking wave height. HKA's analysis was not provided so it is unclear how their analysis suggests 8.9 feet and 9.8 feet high waves at the toe. It is physically impossible for waves of that height to be at the toe of the rock outcropping. It is important to repeat that our analysis is for the most onerous conditions in the future under the highest SLR estimate and the coincidence of the highest tides and larger waves. These conditions represent less than the 1% recurrence oceanographic conditions at the site. Our analysis shows that the proposed development will not be significantly impacted under these conditions.

Worst Case Profile Not Utilized in Analysis

GeoSoils has only used a single profile in their analysis which appears to include the existing condition bluff profile; no wave runup or overtopping analysis with an eroded bluff profile has been, conducted. On the northern part of the site, fill soils comprise the bluff all the way down to the present beach sand level, making the likelihood-of-future erosion and bluff recession in that area very high. Such erosion and recession is expected to reach the proposed home, particularly the northern part: This factor is unaccounted for in the GeoSoils model. GeoSoils states that existing fill soils will be removed and compacted fill soils will be placed between the residence and the ocean. Compacted soils remain susceptible to erosion under ocean wave impact.

We respectfully disagree. Even the California Coastal Commission (CCC) Draft Sea-Level Rise (SLR) Policy Guidance document admits that there is no science that supports that SLR will increase the shoreline bed rock erosion rate. Bed rock erosion due to marine forces is more controlled by the coincidence of very high tides and very large waves. There is no science available that shows that SLR will increase the frequency of large storm waves. The bedrock material at the site is very erosion resistant. Let us assume that sea level rises 5.5 feet, most of this rise will occur from the year 2050 to the year 2110. That is to say for the for the next ~40 years there will not be an increase in the erosion rate of the bed rock outcropping. After the year 2050, under high rate of future sea level rise, it is reasonable to predict the beach sand will narrow and that wave action will act more frequently on the outcropping. In order to predict the response of the bed rock material to the continuous wave action a comparison of Photograph 1 and 2 is pertinent. Photograph 1, taken in 1972, is of a section of shoreline about 2800 feet to the southeast of the site. The rocky outcropping is closer to the shoreline than it is at the project site and is therefore subject to wave action at higher stages of the tide. Photograph 2 is the same rock outcropping taken in 2010. There is no visible erosion of this rocky material, even though it is subject to more frequent wave attack, over the 38 years between the photos. There is no potential significant bed rock erosion hazard at the site over the next 75 to 100 years even in consequence of the maximum predicted SLR.

Photograph 1. Nearby rock outcropping subject to more frequent waves in 1972.

Photograph 2. Nearby rock outcropping subject to more frequent waves in 2010.

Slope Roughness Overestimated

"A Rough Slope Coefficient of 0.398 was used in the GeoSoils modeling, for what we think is the portion of the profile above 3.1 feet NAVD88, which is indicative of an extremely rough surface, which does not exist at the site. Slope Roughness Coefficients of at least 0.8 are appropriate. Use of higher coefficients (which represent smoother surfaces) would significantly increase wave run up, overtopping frequency and overtopping volumes at the site."

Response:

We respectfully disagree with the reviewer. In order to illustrate that the comment "*Use of higher coefficients (which represent smoother surfaces) would significantly increase wave run up, overtopping frequency and overtopping volumes at the site"* is technically incorrect, GSI has repeated the analysis for with the HKA determined "appropriate" roughness coefficient of 0.8. The results of our March 12, 2014 analysis for the 5.5 feet of SLR are shown in TABLE I below and the results using the HKA recommended roughness coefficient of 0.8 analysis is in TABLE II below.

TABLE I

AUTOMATED COASTAL ENGINEERING SYSTEM ... Version 1.02 3/ 9/2014 9:16
Project: WAVE RUNUP LOPERENA SITE CAYUCOS 5.5 FEET SLR

WAVE RUNUP AND OVERTOPPING ON IMPERMEABLE STRUCTURES

Item		Unit	Value	
Wave Height at Toe	Hi:	ft	7.700	Rough Slope
Wave Period	T:	sec	18.000	Runup and
COTAN of Nearshore Slope			50.000	Overtopping
Water Depth at Toe	ds:	ft	9.900	
COTAN of Structure Slope			2.500	
Structure Height Above Toe	hs:	ft	14.200	
Rough Slope Coefficient	a:		0.956	
Rough Slope Coefficient	b:		0.398	
Deepwater Wave Height	H0:	ft	4.747	
Relative Height	(ds/H0):		2.085	
Wave Steepness	(H0/gT^2):		0.455E-03	
Wave Runup	R:	ft	12.952	
Onshore Wind Velocity	U:	ft/sec	3.376	
Overtopping Coefficient	Alpha:		0.500E-01	
Overtopping Coefficient	Qstar0:		0.700E-01	
Overtopping Rate	Q:	ft^3/s-ft	3.473	

TABLE II

AUTOMATED COASTAL ENGINEERING SYSTEM ... Version 1.02 4/ 4/2014 11:17
Project: WAVE RUNUP RESPONSE TO HKA COMMENTS

WAVE RUNUP AND OVERTOPPING ON IMPERMEABLE STRUCTURES

Item		Unit	Value	
Wave Height at Toe	Hi:	ft	7.700	Rough Slope
Wave Period	T:	sec	18.000	Runup and
COTAN of Nearshore Slope			50.000	Overtopping
Water Depth at Toe	ds:	ft	9.900	
COTAN of Structure Slope			2.500	
Structure Height Above Toe	hs:	ft	14.200	
Rough Slope Coefficient	a:		0.956	
Rough Slope Coefficient	b:		0.800	
Deepwater Wave Height	H0:	ft	4.747	
Relative Height	(ds/H0):		2.085	
Wave Steepness	(H0/gT^2):		0.455E-03	
Wave Runup	R:	ft	7.586	
Onshore Wind Velocity	U:	ft/sec	3.376	
Overtopping Coefficient	Alpha:		0.500E-01	
Overtopping Coefficient	Qstar0:		0.700E-01	
Overtopping Rate	Q:	ft^3/s-ft	0.954	

A careful comparison of these two outputs shows that the only input parameters that changed were the rough slope coefficient from 0.398 to 0.8 (per HKA). The overtopping rate with the rough slope coefficient that HKA recommended actually significantly lowered the overtopping rate from 3.47 ft^3/s-ft to 0.954 ft^3/s-ft. Similar significant reduction of the overtopping rate would occur for the 4.6 feet of SLR case using the HKA recommended roughness coefficient of 0.8. This is opposite of the HKA opinion and their suggestion that the analysis would show higher and more frequent overtopping volumes. HKA has provided no independent analysis that would support their opinions.

Wind Velocities Underestimated:

Onshore Wind Velocities of 3.376 feet per second (about 2.25 MPH) were used in the 2014 GeoSoils analysis. Wind velocities of 16.878 feet per second is about 11.6 MPH) were used in the 2013 GeoSoils analysis, closer to actual wind velocities that frequently occur onshore at the site during stormy conditions with large waves. No explanation of why the reduced wind velocity was made. Use of appropriate wind velocities in the 2014 study would significantly increase wave overtopping frequency and overtopping volumes at the site.

Response:

We respectfully disagree with the reviewer. The wave runup and overtopping analysis is not measurably influenced by wind speed. This is primarily due to the wind speed profile near the ground (where the overtopping water is flowing). Figure 2 below shows a typical wind speed profile. The wind speed at ground level is very close to 0.0 ft/sec and then the wind speed increases with height above the ground. In as much as the overtopping

water depth is 1 foot or less, the wind does not increase the rate of overtopping. Wind speed is included in the ACES input menu because the ACES analysis suite includes wind wave generation and other coastal processes that are influenced by wind speed. It should also be noted that the methods for determining wave overtopping in the USACE Coastal Engineering Manual does NOT include contributions for on-shore winds. Finally, TABLE III below includes a wind speed of 25 ft/sec (greater than the HKA suggested wind speed of 16.9 ft/sec) and the HKA roughness coefficient for the 5.5 feet of SLR case. The significant increase in the wind speed between TABLE II and TABLE III resulted in an increase of the overtopping rate of only 0.04 ft^3/s-ft overtopping rate. This is an insignificant change and not a significant increase in wave overtopping, as stated in the HKA review comment.

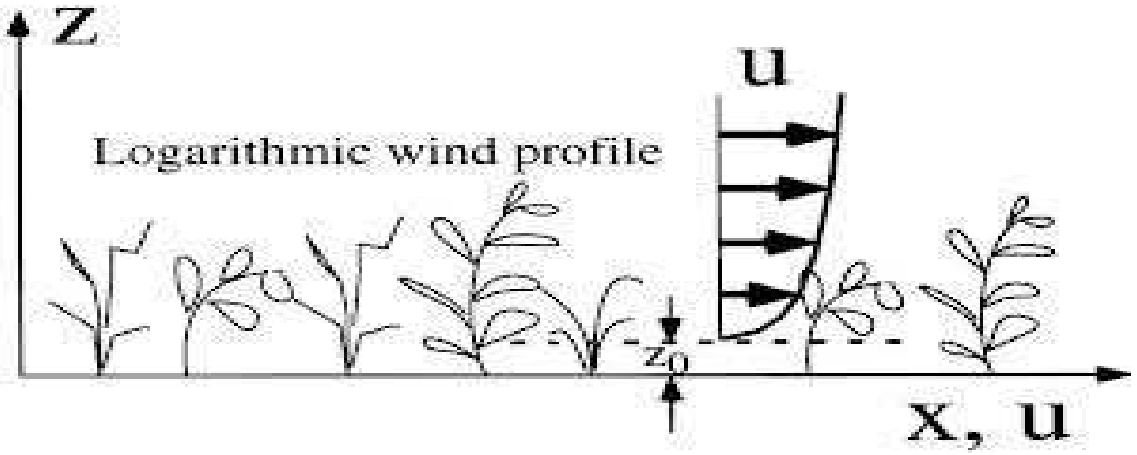

Figure 2. Wind speed profile near the ground.

TABLE III

AUTOMATED COASTAL ENGINEERING SYSTEM ... Version 1.02 4/ 4/2014 11:18
Project: WAVE RUNUP RESPONSE TO HKA COMMENTS

WAVE RUNUP AND OVERTOPPING ON IMPERMEABLE STRUCTURES

Item		Unit	Value	
Wave Height at Toe	Hi:	ft	7.700	Rough Slope
Wave Period	T:	sec	18.000	Runup and
COTAN of Nearshore Slope			50.000	Overtopping
Water Depth at Toe	ds:	ft	9.900	
COTAN of Structure Slope			2.500	
Structure Height Above Toe	hs:	ft	14.200	
Rough Slope Coefficient	a:		0.956	
Rough Slope Coefficient	b:		0.800	
Deepwater Wave Height	H0:	ft	4.747	
Relative Height	(ds/H0):		2.085	
Wave Steepness	(H0/gT^2):		0.455E-03	
Wave Runup	R:	ft	7.586	
Onshore Wind Velocity	U:	ft/sec	25.317	
Overtopping Coefficient	Alpha:		0.500E-01	
Overtopping Coefficient	Qstar0:		0.700E-01	
Overtopping Rate	Q:	ft^3/s-ft	0.993	

Runup Elevations

Although the 2013 and 2014 wave runup analysis by GeoSoils indicates wave runup will reach elevations of 21.1 and 22.9 feet NAVD88, the home remains designed with a door threshold at the northwestern corner of the home at approximately 15 NAVD88, and a basement window on the seawall side of the home at approximately elevation 20 NAVD88.

Response:

We respectfully disagree with the reviewer. HKA is misrepresenting or misunderstanding the results of the ACES analysis. The slope that the wave runs up terminates at the top of the rock outcropping at about elevation +17 feet NAVD88. When the runup reaches that height, 17 feet NAVD88, it becomes an overtopping wave bore with a finite height. As shown in our March 14, 2104 analysis, for 5.5 feet of future SLR, the height of the bore is 1.06 feet. Therefore, the total wave runup height is 18.06 feet NAVD88 at the seaward top of the outcropping. The height diminishes at a rate of about 1 foot for every 25 feet it travels across the site.

The ACES analysis output provides a runup height for an infinite slope. The purpose of providing the runup height on an infinite slope is to help the engineer determine how high the slope would need to be under extreme SLR design conditions to have NO overtopping. The existing slope from the toe of the rock outcropping to the top of the rock outcropping is finite in height. Therefore, HKAs statement that our analysis indicates wave runup above elevation 21 feet NAVD88 is incorrect because they are considering the slope of the rock outcropping to be infinite.

LIMITATIONS

Coastal engineering is characterized by uncertainty. Professional judgements presented herein are based partly on our evaluation of the technical information gathered, partly on our understanding of the proposed construction, and partly on our general experience. Our engineering work and judgements have been prepared in accordance with current accepted standards of engineering practice. This warranty is in lieu of all other warranties express or implied.

Respectfully submitted,

GeoSoils, Inc.
David W. Skelly MS
RCE#47857

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